Amendments to the Drawings:

The two attached sheets of drawings include changes to Figs. 2 and 3. One sheet replaces the original sheet including Fig. 2. In this sheet, the label "Fig. 2" has been deleted. One sheet replaces the original sheet including Fig. 3. In this sheet, the label "Fig. 3" has been deleted.

Attachment: Replacement Sheets

Annotated Sheets Showing Changes

REMARKS

Claims 4-10 are presently in the application. Claims 1-3 have been canceled.

A newly signed declaration and power attorney is enclosed.

The drawings have been objected to as failing to illustrate the "two part clutch" of the original claims. The original claims have been canceled. The new claims do not include the language "two part clutch." Accordingly, withdrawal of the objection to the drawings is appropriate.

A substitute specification submitted with markings showing all the changes relative to the immediate prior version of the specification of record and an accompanying clean version (without markings) are attached to this amendment. The substitute specification includes no new matter.

Original claims 1-3 have been canceled and replaced by new claims 4-10. Care has been taken to ensure that the new claims comply with the requirements of 35 U.S.C. 112, first and second paragraphs.

None of the prior art of record shows a transmission system for combining the rotational velocities from a first and a second rotating shaft and transmitting the combined sum of the rotational velocities to an output shaft using a gear train, clutches and a differential gear box such that the output shaft is driven by the output of the differential gear box at a rotational speed which is approximately equal to: 0, if the clutches associated with said first and second rotating shafts are in a state where no rotational motion is transmitted; V, if the clutch associated with said first rotating shaft is in a state where rotational motion is transmitted and the clutch

associated with said second rotating shaft is in a state where no rotational motion is transmitted; .5V, if the clutch associated with said first rotating shaft is in a state where no rotational motion is transmitted and the clutch associated with said second rotating shaft is in a state where rotational motion is transmitted; or 1.5V, if the clutches associated with said first and second rotating shafts are in a state where rotational motion is transmitted, as set forth in new claims 4-10.

Please charge the fee for any necessary extension of time to deposit account No. 07-2100.

Entry of the amendment and allowance of the application are respectfully requested.

Respectfully submitted,

Date: May 5, 2006

Ronald E. Greigg
Registration No. 31,517
Attorney for Applicants

GREIGG & GREIGG, P.L.L.C.
1423 Powhatan Street, Suite One
Alexandria, VA 22314
Telephone: (703) 838-5500
Facsimile: (703) 838-5554

REG/JFG/ncr

Enclosures: Substitute Specification w/Markings
Clean Version of Substitute Specification
Executed Declaration and Power of Attorney

CUSTOMER NO. 02119

J:\Cavicchioli\06-05-05, Response to Jan 5, 06 OA.wpd

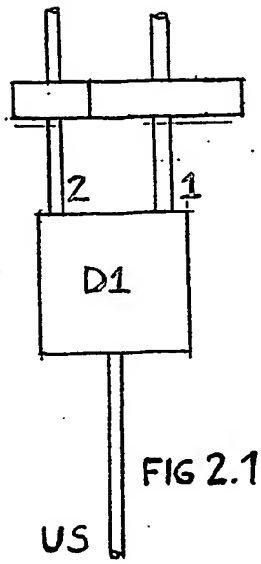

FIG 2.1

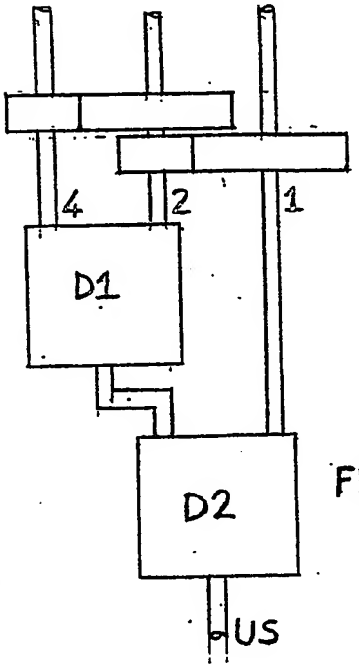

FIG 2.2

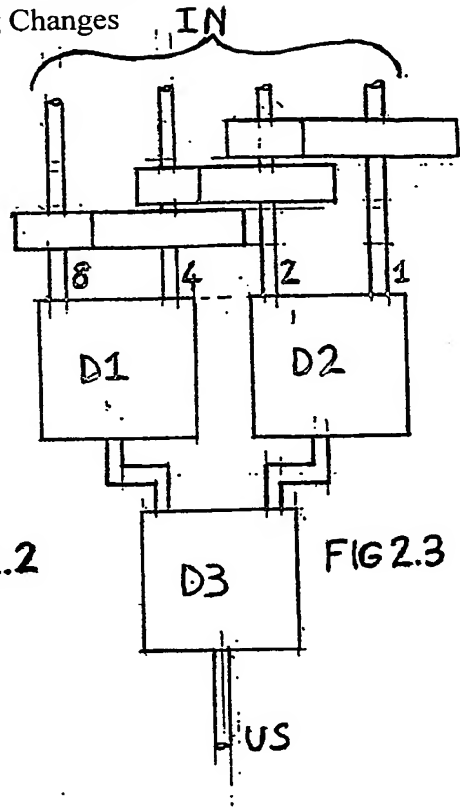

FIG 2.3

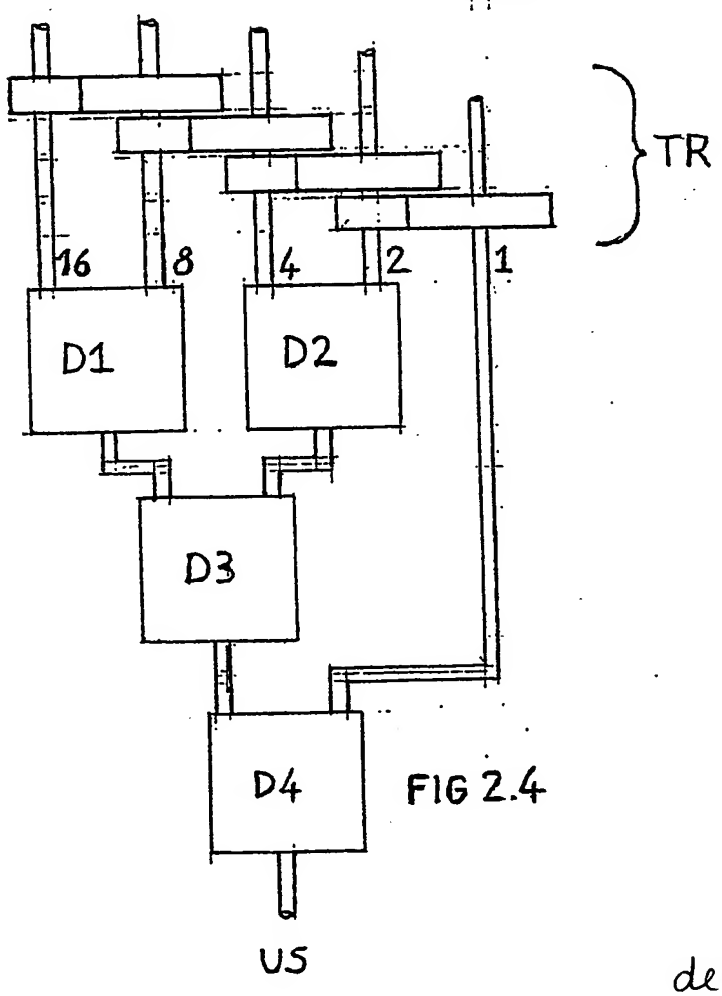

FIG 2.4

deleted ~~FIG. 2~~

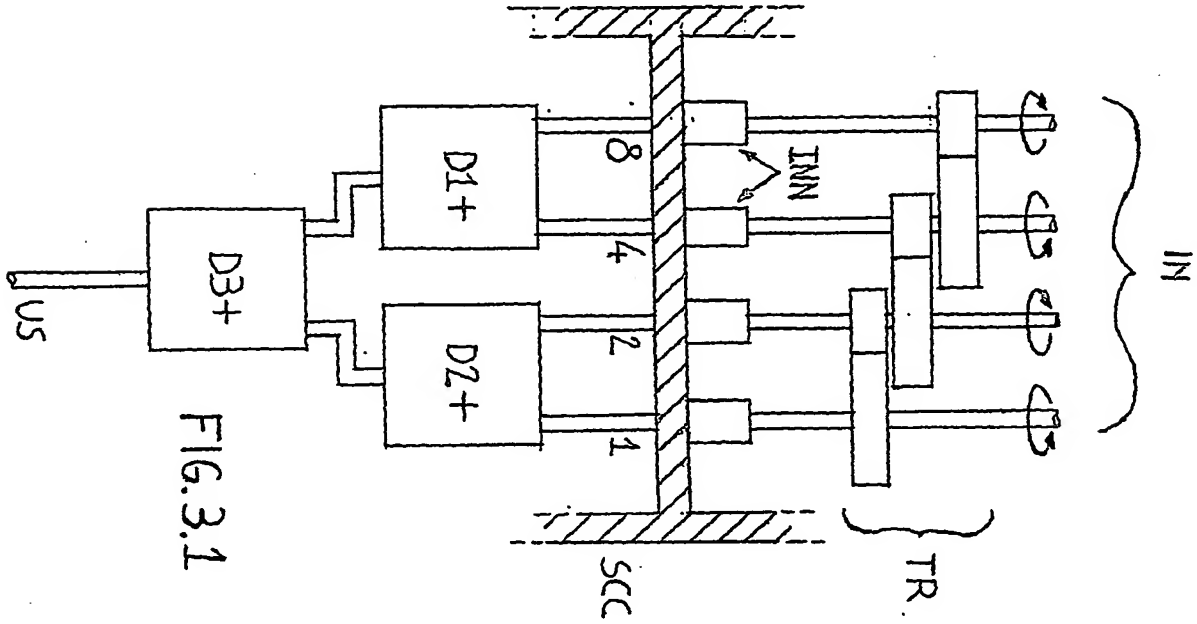

FIG. 3.1

64	32	16	8	4	2	1	
			○	○	○	○	NEUTRAL
			○	○	○	●	1ST
			○	○	●	○	2ND
			○	○	●	●	3RD
			○	●	○	○	4TH
			○	●	○	●	5TH
			○	●	●	○	6TH
			○	●	●	●	7TH
			●	○	○	○	8TH
			●	○	○	●	9TH
			●	○	●	○	10TH
			●	○	●	●	11TH
			●	●	○	○	12TH
			●	●	○	●	13TH
			●	●	●	○	14TH
			●	●	●	●	15TH

FIG. 3.2

deleted→ FIG. 3

SUBSTITUTE SPECIFICATION WITH MARKINGS

ADDITIVE ~~GEARSHIFT~~ **GEARBOX** WITH DIFFERENTIAL

~~TECHNICAL FIELD: MECHANICS~~

[0001] BACKGROUND ~~ART~~ **OF THE INVENTION**

[0002] **Basically** ~~Basicly~~ there are 3 main types of **gearboxes** ~~gearshifts~~: manually shifted gearbox with a maximum of about 20 speeds for trucks and 6 for cars; gearbox with planetary gear sets; **and** continuously variable transmission (CVT).

[0003] **BRIEF SUMMARY OF THE** DISCLOSURE ~~OF INVENTION AND BRIEF DESCRIPTION OF DRAWINGS~~

~~Introduction:~~

[0004] This invention can be catalogued as **a** MECHANICAL GEARBOX, but compared with the usual [[gear]] **gearbox**, this one has nearly the **advantages of a** CVT's (continuously variable ratio transmission) ~~advantages~~ for its high number of obtainable speeds. The speed-range is very wide ~~(top gears very high and low gears very low)~~[[,]] and the gap between [[them]] **the various speeds** can be very small.

[0005] ~~This mechanism~~ **The gearbox of the present invention** is extremely versatile and [[it]] can be configured in different ways by small variants in the **construction of the gearbox** ~~costruction stage~~. It is possible to obtain[[:]] **, for example,** all forward gears,[[;]] one reverse gear and all ~~restaining~~ **remaining** forward gears,[[;]] more reverse gears, or as many reverse gears as forward gears with the same ratios.

[0006] ~~Every single gear is selectable respecting a definite code to operate the~~ **The rotational velocity of the output is selected by engaging or disengaging one or more** clutches inside the gearbox, and the procedure is fast without the need of a main friction clutch**. A neutral gear is also available**.

~~Explanation~~

[0007] ~~This mechanism~~ **With a single rotational velocity of the input, the gearbox of the present invention** is able to output many speed-levels ~~(under the same input)~~. The number of speeds depends on the ~~device complexity due to the quantity of~~ **number of** differential gears **employed, for example,** ~~in it. Examples:~~ 1 differential=3 speeds;[[,]] 2 differential=7 speeds;[[,]] 3 differential=15 speeds;[[,]] 4 differential=31 speeds;[[,]] and so on. In this **invention,** ~~application~~ the task of the differential gear is simply to add the speed of two different input shafts rotating in the same direction, and return **as an output** on a third shaft, the right value of speed with its proportional torque.

[0008] **BRIEF DESCRIPTION OF THE DRAWINGS**

[0009] **Fig. 1 is a schematic, side view of a differential gearbox;**

[0010] **Figs. 2.1-2.4 illustrate the overall principle of the present invention, including four examples, showing how it would be possible to connect together 1 to 4 differential gears in order to get 3 to 31 different speed ratios;**

[0011] **Fig. 3.1 is a schematic illustration of how clutches are employed in the present invention;**

[0012] **Fig. 3.2 illustrates a simply coding arrangement for controlling the clutches of Fig. 3.1 to obtain various rotational velocities at the output shaft; and**

[0013] **Fig. 4 is a schematic illustration of one embodiment of the invention.**

[0014] FIG. 1 illustrates a ~~common~~ **prior art** differential ~~gear now~~ **gearbox** used to make additions. A and B are input shafts which rotate in the same direction. The speed of **shaft** B has been reduced by 50% **of that of shaft A** by gears R1 and R2. **Gear** R1 is bored out in the center to allow free passage [[to]] **of** the input shaft A **through gear R1**. **Gear** R1 is **fixed to rotate** ~~in sympathy~~ with the differential **gearbox** ~~box named~~ SCD. ~~Important parts are two~~ **Two** free-wheels RL **are** mounted on **each of** [[both]] input shafts **A and B** in order to [[lock]] **prevent** them **from rotating** in the direction ~~opposit~~ **opposite** to the ~~nominal~~ **normal**

rotating direction. ~~This in~~ **In** the case **where** one of **the** two input shafts is stationery and there is a load on the output shaft C_3[[:]] without free-wheels the stationery input shaft would start rotating in the ~~opposit~~ **opposite** direction and no torque would come from **output shaft** C.

[0015] The **rotational velocity of the output shaft** ~~output~~ C will be exactly the sum of **the rotational velocities of shafts** A and B_3 but with ~~opposit~~ **an opposite** rotating direction. RC are four conical gears. ~~I want to specify that free-wheels~~ **Free-wheels are not absolutely necessary in** ~~will not be mounted on~~ the ~~invenction~~ **invention**, [[it]] [[is]] **they are** just **one** [[a]] way to solve the problem **discussed above**.

[0016] Now, ~~we can go on~~ to an overall principle scheme of the gearbox **of the present invention**. ~~In FIG. 2 there are~~ **Figs. 2.1 - 2.4 illustrate** four examples showing how it would be possible to connect ~~together~~ 1 to 4 differential gears in order to get 3 to 31 different speed ratios. As [[we]] can **be seen** ~~observe in the plan, the second inportant~~ **an important** part of the mechanism consists in the gear train TR put before the differential gears. Input shafts to the differential gears come from TR and respectively from left to right, each one rotates at the previous one's half speed. ~~By common consent I named~~ **As shown in the drawings,** the input shafts **connected** to the differential gears **are identified** with the ratio numbers of their **relative speeds** ~~speed on the grounds of the slowest of all~~. The lowest number is 1 ~~and it is also~~ **which is** the lowest speed ~~value inside the mechanism~~ and **which also represents** the minimum increase unit of the final output US.

[0017] For ~~porpouse~~ **purposes** of explanation **and because of its average complexity and number of output speeds**, ~~from now on we shall take into account a~~ **the** 3-differential gears and 4-input shafts gearbox **shown in Fig. 2.3 will be discussed** ~~only (FIG.2.3), because of its avarage complexity and speeds number~~.

[0018] The example of FIG.2.3 shows a 15 ~~speeds~~ **speed** gearbox. It provides 15 speeds with ratios from 1 to 15, increasing from speed to speed ~~allways~~ **always** by 1. There are four possible input shafts **IN** to the gearbox ~~named IN~~. ~~They must be connected to~~ **Each input shaft IN is connected to** the gear train TR. ~~Supposing to enter into the gearbox with an 80 rpm motor in junction with the input shaft 8, we'll get from~~ **Where input shaft 8 is driven at 80 rpm by a motor, it is possible for** the output shaft US **to be driven within** a speed range from 10 to 150 rpm, increasing from speed to speed by 10 rpm. The input shaft **1** at the far right is ~~allways~~ **always** the minimum increase unit (as previously described). ~~At this point, supposing to enter into the gearbox with~~ **As another example, if** an 80 rpm motor **is connected to input shaft 1,** ~~in junction with that shaft (named 1), we'll get from US~~ a speed range from 80 to 1200 rpm, [[but]] with an increment of 80 rpm**, is obtainable from output shaft US**.

[0019] ~~This invention could never work without~~ **In order for the invention to operate properly** clutches[[,]] **are** essential to engage any speed[[,]] ~~not described yet~~. As FIG.3.1 shows, ~~now, on~~ every ~~single~~ input shaft, between the gear train TR and the differential gear D, ~~there~~ is **provided with** a clutch ~~named~~ INN. Clutches **block** [[cut]] or transmit the motion **of the individual input shafts, 8, 4, 2, 1** to the differential gears as needed, and combined

together they determine every ~~single~~ possible speed. Every single possible combination is assured by a simple table (FIG.3.2), calculated on the grounds of the binary number system. The table shows ~~clutches state~~ **clutch states** according to the speed to be engaged. On the horizontal axis, there is **represented the** ~~every single~~ input ~~shaft~~ **shafts**; on the vertical axis, there **is represented** [[are]] the speed numbers. The black dot indicates motion transmission through the clutch, and the white dot indicates no motion transmission.

[0020] The clutches **used** ~~in use~~ must be DUAL-ACTION type**, that is,**[[.]] ~~It means~~ they must have two different states: the first one is motion transmission; the second one is no motion transmission[[,]] ~~but this one~~ **and they** must also lock, in both rotating directions, the part of the shaft entering into the differential gear and get it in sympathy with the gearbox ~~named~~ SCC (FIG.3.1).

[0021] Up to now, all **that** has been explained is [[just]] a theoretical explanation of the invention. Its practical realization will be different from some points of view due to the absolute necessity to respect the rotating directions of every single shaft inside the gearbox. It is very important for the right operation of ~~all mechanism~~ **the invention**.

[0022] According to the rotating directions of the two input shafts in a differential gear used to make additions (as FIG.1), from the output shaft C, we can get an addition or a subtraction. Now if we shape the gearbox combining additions and subtractions, as output we obtain a speed range including reverse gear. It is also possible to obtain many different reverse gears, but the total number of speeds is 15 plus a neutral gear. The obtainable configurations are ~~varius~~ **various**.

[0023] From now on, for ~~porpouse~~ **purposes** of explanation, the 3 differential gears inside the gearbox ~~we are talking about~~ are all addition type ("+" sign in FIG.3.1). Consequently all forward 15 speeds are available.

[0024] [[In]] FIG.4 ~~we can see~~ **shows** an overall view of [[the]] **an actual** mechanism **for carrying out the invention** ~~as it can work~~. There are some changes compared with FIG.1 and FIG.3.1: on the gear train TR and on both internal gears RDI of the differential gears ~~DI~~ **D1** and D2. The reason is simple. In FIG. 1, input shafts A and B rotate in the same direction (obligatory condition to obtain additions). Nevertheless, a 4-shafts gear train as FIG. 3.1 inverts the rotating direction from [[a]] **one** shaft to another, so we could never obtain two adjoining shafts with the same rotating direction. That is why the internal gear is necessary: like chains or belts, it does not revers the motion.

[0025] However, using this type of gear, it is not possible to obtain a 50% reduction ratio (as FIG. 1)[[,]] between R3 and RDI, because of the encumbrance of the shaft going into the differential gear. So, we can obtain a one-third reduction ratio, but the difference must be compensated by changing gear train ratios. On TR, we shall obtain an irregular sequence of different ratios that, if correctly calculated, are equivalent to **the** theoretical ones [[on]] **in** FIG. 3.1.

[0026] Gears R1 and R2 have **a** 50% reduction ratio. R1 is in sympathy with the differential box of D3, and it is bored out in the center to allow free passage to the shaft coming from D1. It is the same **with** ~~about~~ RDI. SCC is the gearbox that clutches INN (not drawn in every

detail) are locked to. SCD are differential boxes that gears RDI and R1 are in sympathy with. The differential gear D3 has not been drawn in every detail, but it is exactly identical to D1 and D2. RC are 4 conical gears inside each differential box. US is the final output shaft, and it rotates [[at]] **in** the same direction [[of]] **as** the input shaft IN.

[0027] **The foregoing relates to preferred exemplary embodiments of the invention, it being understood that other variants and embodiments thereof are possible within the spirit and scope of the invention, the latter being defined by the appended claims.**

~~BEST MODE FOR CARRYING OUT THE INVENTION:~~

~~Make an agreement with a metal and mechanical works.~~

~~INDUSTRIAL APPLICABILITY:~~

~~All motor vehicles and industrial machineries.~~